HSL No. 73-2
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THIS ISSUE CONTAINS:
HS-012 063 - HS-012 131
HS-800 692; 701; 702; 703; 704; 722; 723
HS-810 240; 241; 242; 243

U.S. Department of Transportation
National Highway Traffic Safety Administration

Highway Safety Literature

. . . A SEMI-MONTHLY ABSTRACT JOURNAL

AVAILABILITY OF DOCUMENTS

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and report number.** Prepayment is required by GPO coupon (NTIS coupons are not acceptable), check or money order (made payable to the Superintendent of Documents).

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NHTSA: National Highway Traffic Safety Administration, General Services Division, Washington, D.C. 20590, **Give HS-No.**

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. **Order by title and SAE report numbers.** Prices given are list; discounts are available to SAE members and sometimes to libraries and U.S. Government Agencies. Prepayment is required; orders received without payment are subject to a $1 handling charge.

Journal articles should be obtained from the publisher.

Material directly related to Highway and/or Motor Vehicle Safety is solicited for inclusion in Highway Safety Literature. Topics must fall within the scope of the Subject Fields and Groups listed on the inside front cover. Submit material, together with a written statement of approval for publication to:

Office of Administrative Services (N48-50)
National Highway Traffic Safety Administration
400 7th Street, S.W.

NHTSA SUBJECT FIELDS AND GROUPS

Entries in **Highway Safety Literature** are arranged under five major **subject fields** (e.g. 1/0 Accidents; 2/0 Highway Safety; etc.). Each m subject field is sub-divided into **subject groups** such as /1; /2; /3, etc. Documents related directly to the National Highway Traffic Sa Administration (NHTSA) are numbered according to the following series: Accident Investigation Reports HS 600 000; Compliance Test Re HS 610 000; Contractor's Reports HS 800 000; Staff speeches, papers, etc. HS 810 000; Imprints HS 820 000.

Documents containing several articles are announced as a complete volume in the subject category most applicable to it as a whole. Entrie individual articles are listed in their most specific category.

SAMPLE ENTRIES

Subject Categories →

NHTSA Accession No. HS-800 218 Fld. 5/21; 5/9

Title of document: AN INVESTIGATION OF USED CAR SAFETY STANDARDS–SAFETY INDEX: FINAL REPORT. VOL. 6 – APPENDICES G-L

Personal author(s): by E. N. Wells; J. P. Fitzmaurice; C. E. Guilliams; S. R. Kalin; P. D. Williams

Corporate author: Operations Research, Inc.

Pagination →

Publication date: 1969 150p
Contract FH-11-6921 Report no. ORI-TR-553-Vol. 6; PB-190 523

Abstract: Appendices G-L to this study of used car safety standards include: indenture model diagrams for classes I-IV motor trucks; degradation, wear, and failure data for motor truck classes I-IV; and safety index tables for classes I-IV motor trucks.

Search terms; Wear; Trucks; Failures; Used cars; Inspection standards

Availability: NTIS

HS-004 497 Fld. 5/19

AUTO THEFT–THE PROBLEM AND THE CHALLENGE

by Thomas A. Williams, Sr.

Journal citation: Published in *FBI Law Enforcement Bulletin* v37 n12 p15-7 (Dec. 1968)

Gives figures on the extent of the auto theft problem and comments on anti-theft devices available now or in the planning stage.

Search terms: Theft; Theft protection; Stolen cars

(Note: If the date of a report or Journal article is not given, the small letters nd will appear)

NOTE: ( ) Numbers in parentheses following certain subject groups indicate the Highway Safety Program Standards (No. 1 and up) and/or Federal Motor Vehicle Safety Standards (No. 101 and up) which may apply to these groups.

1/0 ACCIDENTS

1/2 Injuries

HS-012 084 Fld. 1/2; 1/5

SOME FACTORS AFFECTING THE INCREASE OF ROAD ACCIDENTS IN DEVELOPING COUNTRIES, WITH PARTICULAR REFERENCE TO ISRAEL

by M. Livneh; A. S. Hakkert

Published in *Accident Analysis and Prevention* v4 n2 p117-33 (Jun 1972)

7refs

It is assumed that in the 1980's mileage per vehicle and per capita in Israel will approach the figures current in such countries as the U. S. A. and England, i.e. approximately 15,000 km. per vehicle. On the basis of this assumption and other detailed assumptions regarding the ratio of casualties to vehicles involved, and the severity of accidents, the number of casualties and fatalities has been computed for a vehicle population of one million in Israel. The number of fatalities per one million population in Israel is compared with England and the U. S., and the computed figure is 1,170 fatalities in 1985. The anticipated rise in the number of accidents and fatalities to 45,000 and 1,170 respectively by 1985 indicates an average annual growth of approximately 5%.

Search terms: Israel; Automobile population; Demographic projections; Accident rates; Injury rates; Vehicle mileage; Accident risk forecasting; Injury prediction; Fatality rates; Developing countries; Accident severity; Accident factors

HS-012 108 Fld. 1/2; 3/2; 4/7

MATHEMATICAL MODEL OF A HEAD SUBJECTED TO AN AXISYMMETRIC IMPACT

by R. Hickling; M. L. Wenner

General Motors Corp., G 06600

1972 46p 25refs

Prepared for publication in *Journal of Biomechanics.*

An improved mathematical model is derived which predicts more closely the response of a head to an axisymmetric impact. The three-dimensional equations of linear viscoelasticity are used to describe the behavior of both the brain and the skull. Responses of both human-sized and small animal heads are calculated for steady-state and for transient loadings. An explicit formula is derived for scaling experimental data on contre-coup damage from laboratory animals to humans. General agreement is found between the predictions of the model and observation, with regard to the location and the nature of possible damage. However, before the model can be used to make satisfactory quantitative predictions of the severity of injury, additional empirical data are required on both damage criteria and the mechanical behavior of the brain and skull.

Search terms: Mathematical models; Head impact tolerances; Viscoelasticity; Skull; Animal impact tolerances; Brain; Steady state; Shear stress; Shear modulus; Pressure responses; Equations of motion

1/3 Investigation

HS-012 076 Fld. 1/3; 1/5

MOTOR VEHICLE ACCIDENTS INVOLVING COLLISION WITH FIXED OBJECTS

by F. D. Newcomb; D. B. Negri

New York State Dept. of Motor Vehicles, N 51000

[197-] 14p

This report presents information on a sample of motor vehicle collisions with utility poles and other types of fixed objects. The accidents selected for detailed analysis were ran off road and collision with fixed object accidents occurring in New York State during the period February 12-18, 1971. Colliding with guardrails was the most frequent fixed object collision type followed by collision with telephone (utility) poles, trees, and light poles. An analysis of telephone pole collision loss is presented. The estimated annual costs of such collisions as well as the estimated net savings from the elimination of vehicle telephone pole collisions are calculated. It is suggested that the information derived may be applicable to evaluating the economic impact of the underground placement of telephone lines. Tables presenting information on the frequency, damage costs, causes, weather and road conditions, and location of the accidents studied are included.

Search terms: Vehicle fixed object collisions; Vehicle light pole collisions; Accident analysis; Ran off road accidents; Accident rates; Accident costs; Damage costs; Injury costs; Accident causes; New York (State); Guardrails; Property damage accidents; Accident statistics; Accident types; Environmental factors

HS-800 692 Fld. 1/3; 1/5

MULTIDISCIPLINARY ACCIDENT INVESTIGATION. MMF—FINAL REPORT 1971

Maryland Medical-Legal Foundation, Inc., M 09600

1972 419p refs
Contract FH-11-7399

A multidisciplinary highway accident investigation program was carried out during a 13 month period in the Baltimore metropolitan region and surrounding rural area. Investigations of 36 accidents included vehicular examination, accident scene visit, complete autopsy of all fatally injured drivers and some passengers with complete toxicological analysis for alcohol and a wide

1/3 Investigation (Cont'd.)

HS-800 692 (Cont'd.)

variety of drugs, and extensive psychological evaluation of many drivers. Methodology, results, and comments on current and proposed Federal Safety Standards and on periodic motor vehicle inspection are given. Included are reports on a number of special interest cases, including carbon monoxide poisoning in a vehicular setting, action taken to improve several segments of highways that had environmental hazards, and action to notify manufacturers of defects in door latch systems and sealing mechanisms for rear trunk area doors.

Search terms: Accident investigation; Multidisciplinary teams; Baltimore; Crash phase; Postcrash phase; Drinking drivers; Driver intoxication; Accidents by vehicle age; Fatalities by age; Fatalities by sex; Highway safety standards; Precrash phase; Drugs; Vehicle inspection; Door latches; Blood alcohol levels; Suicide by vehicle; Accident factors; Accident types; Injury statistics; Carbon monoxide poisoning; Accident reconstruction; Fatalities by seat occupation; Fatality causes; Injury severity; Accident case reports; Autopsies; Accident causes; Restraint system usage; Restraint system effectiveness; Driver characteristics; Human factors; Psychological factors; Vehicle safety standards; Highway improvements; Environmental factors

AVAILABILITY: NTIS

2/0 HIGHWAY SAFETY

HS-012 098 Fld. 2/0; 1/5

FEDERAL TRANSPORTATION SAFETY PROGRAMS—MISDIRECTED EMPHASIS AND WASTED RESOURCES

by G. M. Davis; M. T. Farris

Published in *Transportation Journal* v11 n4 p5-17 (Summer 1972)

49refs

Three paramount problems have combined to diminish the effectiveness of federal transportation safety programs. First, inadequate resources are allocated to motor vehicle safety. Second, transportation safety is managerially perceived as a heterogeneous phenomenon peculiar to each mode of transportation. In this respect, transportation safety statutes are administered by modally aligned, dispersed federal agencies lacking central authority, direction, and coordination. Third, Congress and the Executive Branch are aviation safety oriented, although the motor vehicle accident rate is much higher. Statistical data examined in this paper indicate that preventive emphasis should optimally be directed to the 20-34 years of age groups, during certain days and hours of the week. Congress, the Department of Transportation, and the National Transportation Safety Board must place transportation safety in its proper perspective and pragmatically direct its collective efforts and resources to motor vehicle safety.

Search terms: Vehicle safety; Highway safety programs; Aircraft safety; Driver age; Day of week; Time of day; Accident statistics; Fatality rates; Safety program effectiveness; Safety laws; Federal role; Department of Transportation; Young adult drivers; National Transportation Safety Board; Aircraft accidents; Adult drivers; Budgets; Program evaluation; Transportation problems; Financing; Appropriations; Accident rates; Vehicle accidents

2/5 Lighting

HS-012 100 Fld. 2/5; 5/10

LIGHTING, VISIBILITY AND ACCIDENTS

Organisation for Economic Co-operation and Devel. (France), O 19200

1971 111p 15refs

This report reviews the state-of-the-art of artificial lighting on roads and vehicles as well as the data available on the effect of public lighting on accidents. The standardization of headlights, vehicle markers, and signaling lights is stressed. It is concluded that there is insufficient evidence available to recommend solutions to the major problems, and eight areas which would benefit from international cooperation are listed: polarized headlights; use of vehicle front lights on lighted roads; vehicle markers and signaling lights; supplementary lighting at pedestrian crossings; traffic problems at twilight; improvements in conventional headlights; effect of public lighting on safety and traffic; and effect of road surface texture and color on visibility and safety at night.

Search terms: International factors; Vehicle lighting; Highway lighting; Street lighting; Benefit cost analysis; Polarized headlamps; Front lamps; Sidemarker lamps; Signal lamps; Twilight vision; Pavement reflectivity; Headlamp standards; Pavement surface texture; Pedestrian crossings; Highway lighting standards; Lamp standards; State of the art studies; Rear lamps; Pavement markings; Reflectorized pavement markings; Colored pavements; Accident rates; Night visibility; Lighting standards

AVAILABILITY:
OECD Publications Center,
Suite 1207
1750 Pennsylvania Ave. N.W.
Washington, D.C. 20006, $3.00

2/7 Meteorological Conditions

HS-012 063 Fld. 2/7; 3/8; 5/6

ROADS AND THE ENVIRONMENT

by M. E. Burt

Transport and Road Res. Lab. (England), T 33900

1972 41p 19refs
Report no. TRRL-LR-441

Presented at the Conference on Urban Environment, Devel. and Pollution, Guildford, Surrey, England, 16-18 Sep 1970.

The benefits that roads and road vehicles render the community are briefly stated and their adverse effects on the environment are reviewed in four fields: traffic noise, air pollution, vibration, and intrusion. The present state of knowledge is outlined in each area and an indication given of desirable research and development. Emphasis is placed on the need for some means of assessing environmental benefits in financial terms so that environment factors can be given their fair weight in relation to economic factors when decisions are made.

Search terms: Traffic noise; Noise control; Vehicle noise; Noise standards; Vehicle air pollution; Exhaust emissions; Exhaust composition; Noise control costs; International factors; Vibration response; Highway environmental impact; Pedestrian safety; Acoustic measurement; Sound intensity; Noise exposure; Fuel composition; Air pollution laws; Exhaust emission control; Liquified petroleum gases; Exhaust emission standards; Air pollution control; Air pollution control costs; Engine modification; Economic factors; Environmental factors; Air pollution effects; Vibration

HS-012 065 Fld. 2/7; 5/6; 4/8

URBAN TRANSPORT AND ENVIRONMENTAL POLLUTION

by L. H. Watkins

Transport and Road Res. Lab. (England), T 33900

1972 23p 13refs
Report no. TRRL-LR-455

Presented at 5th Symposium on the Future of Conurbation Transport, Univ. of Manchester, 19-21 Oct 1971.

This paper identifies the major adverse environmental effects of conurbation roads and road traffic as noise, air pollution, vibration, visual intrusion, physical interference, and severance. Techniques are described for countering these adverse effects, and wherever possible criteria are given. The paper discusses control by planning and legislation, and gives a brief indication of the environmental consequences of two possible transportation systems of the future: the Cabtrack system and URBA, a French experimental suspended monorail.

Search terms: Traffic noise; Noise control; Vehicle noise; Vehicle air pollution; Air pollutants; Environmental planning; Environmental factors; Urban transportation; Exhaust emission control; Air pollution control; Vibration; Highway environmental impact; Urban planning; Highway planning; Exhaust composition; Urban highways; Transportation systems

HS-012 089 Fld. 2/7

THE OBJECTIVE METHOD OF EVALUATING ASPIRATION WIND NOISE

by H. Jagtiani

Chrysler Corp., C 42600

1972 11p 6refs
Report no. SAE-720506

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Cars at high speeds are subjected to differentials in pressure between the car interior and the car exterior. The pressure differentials are sufficient to cause body seals in certain locations to permit air to pass by the seal, resulting in a noise defined as aspiration wind noise. An objective method of measuring aspiration wind noise at the leak source is introduced for cars at 70 mph and for static cars pressurized to simulate 70 mph. This method, using a meter, replaces the previously used method of subjective evaluation of the loudness of wind noise. An advantage of the new method is that it disregards the car exterior air turbulence noise component, which is a function of car styling and aerodynamics.

Search terms: Wind noise; Acoustic measurement; Seals; Sound intensity; Acoustics; Dynamic tests; Static tests; Leakage; Pressurization; High speed; Measuring instruments

AVAILABILITY: SAE

HS-012 091 Fld. 2/7; 5/4

IMPORTANCE OF ACOUSTICAL LEAKS IN PASSENGER CAR BODIES

by J. D. Shedlowsky

General Motors Corp., G 06600

1972 7p
Report no. SAE-720507

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

In its treatment of acoustical leaks in passenger car bodies, this paper considers the general principle of noise control in a passenger compartment, the concept of acoustical leaks, examples of such leaks, and design guidelines for acoustical isolation. The paper states that the basic problems can actually be designed into vehicles through lack of understanding of acoustical principle, and various examples are given in illustration. Remedies for some of these deficiencies are also proposed. Finally, design principles formulated to eliminate acoustic leaks are presented.

Search terms: Noise control; Passenger compartments; Leakage; Acoustic measurement; Automobile interior design; Acoustics; Vehicle noise; Noise standards

AVAILABILITY: SAE

2/8 Police Traffic Services

HS-800 701 Fld. 2/8; 1/4

SELECTIVE TRAFFIC ENFORCEMENT MANUAL. FINAL REPORT

by W. H. Franey; N. Darwick; F. D. Roberson

International Assoc. of Chiefs of Police, Inc., I 37800

1972 210p 58refs
Contract DOT-HS-036-2-226

The purpose of this contract was to produce a manual on selective enforcement in a form suitable for adoption by the NHTSA; to set policies on major issues facing local, state, and federal police agencies in the area of highway safety; to disseminate this information to the police profession through regional and national meetings; and to produce for consideration by the NHTSA an outline of a document on statewide police traffic services programs. Appendices cover the 16 highway safety program standards, a general order on and sample policy for investigations of vehicle collisions, standard police traffic collision reports, helicopter unit standard operating procedure, sample highway patrol directive on enforcement policy, and classification of traffic law violations.

Search terms: Highway safety programs; Manuals; Manpower utilization; Traffic law enforcement; Police traffic services; Patrolling; Accident analysis; Accident reports; Accident investigation; Accident location; Accident types; Speed recorders; Helicopters; Accident rates; Police training; Drinking drivers; Alcohol laws; Highway safety standards; Driver intoxication; Accident report forms; Traffic law violations; Traffic surveillance; Law enforcement effect on accident rates

AVAILABILITY: NTIS

HS-800 702 Fld. 2/8; 4/5

COMPUTERIZED ALLOCATION OF POLICE TRAFFIC SERVICES, A DEMONSTRATION STUDY. FINAL REPORT

by R. K. Jones; K. B. Joscelyn

Indiana Univ. I 22200

1972 163p 41refs
Contract DOT-HS-034-1-039
Report no. DOT-NHTSA-034-1-039-72-1

A study was conducted to develop and implement a computerized highway traffic information system (CHTIS) for use in allocating police traffic services. The information system utilized a computer-sensor system to gather, process, store, and display traffic flow information from 25 key highway locations in Monroe County, Indiana. The resulting information was provided to a local Indiana State Police post for use in conducting traffic law enforcement operations. It was concluded that the system is a highly useful operational tool for traffic law enforcement agencies. It was quickly and enthusiastically accepted by the police officials and was used regularly in assigning patrols so as to reduce traffic risks. The study recommends the establishment of a continuing traffic resource allocation laboratory utilizing a CHTIS and the initiation of a program to analyze the unique data base made available by the system.

Search terms: Indiana; Police traffic services; Patrolling; Traffic surveillance; Automated law enforcement systems; Operations research; Traffic data analysis; Computerized records management; Information system design; Traffic flow; Emergency reporting systems; Real time operations; Flow charts; Accident risks; Law enforcement effect on accident rates; Speed patterns; Manpower utilization; Vehicle detectors; Automated accident records; Traffic law violations; Accident factors; Mathematical models; Accident location; Traffic law enforcement; Systems analysis

AVAILABILITY: NTIS

HS-800 703 Fld. 2/8; 4/5

COMPUTERIZED ALLOCATION OF POLICE TRAFFIC SERVICES. REFERENCE VOL. 1. COMPUTER-SENSOR SYSTEM DESCRIPTION. FINAL REPORT

by R. K. Jones; K. B. Joscelyn

Indiana Univ., I 22200

1972 211p
Contract DOT-HS-034-1-039
DOT-NHTSA-034-1-039-72-2

A computerized highway traffic information system was designed for use in allocating police traffic services. This volume describes the computer sensor system, which was designed to solve problems which have occurred in connection with devices previously used to collect data about traffic flow.

Search terms: Indiana; Police traffic services; Computer programs; Data acquisition; Data processing; Traffic surveillance; Automated law enforcement systems; Operations research; Traffic flow; Traffic data analysis; Computerized records management; Information system design; Manpower utilization; Traffic law enforcement; Systems analysis; Flow charts; Vehicle detectors; Sensors

AVAILABILITY: NTIS

HS-800 704 Fld. 2/8; 4/5; 1/5

COMPUTERIZED ALLOCATION OF POLICE TRAFFIC SERVICES. REFERENCE VOL. 2. ACCIDENT DATA HANDBOOK. FINAL REPORT

by R. K. Jones; K. B. Joscelyn

Indiana Univ., I 22200

1972 241p
Contract DOT-HS-034-1-039
Report no. DOT-NHTSA-034-1-039-72-3

This volume contains a detailed presentation of 1970 traffic accident statistics for Monroe County, Indiana, and procedures for producing such statistics for any suitably defined jurisdiction having computer tape files of accident reports. The statistics are presented in the form of graphs and tables, produced by computer, which can be used in developing better, risk-oriented procedures for allocating police traffic services. Five dependent variables were used: total number of accidents, number of property damage accidents, number of personal injury accidents, number of fatal accidents, and estimated direct cost of accidents. Three series of presentations were prepared. The first relates accidents to time, visibility, weather condition, and police jurisdiction of the accident location. The second shows accident disutility for each of several key highway segments. A third series shows total accidents by day of week and time of day for a given month.

Search terms: Indiana; Police traffic services; Automated law enforcement systems; Automated accident records; Computerized records management; Accident statistics; Information system design; Month; Day of week; Time of day; Accident rates; Accident risks; Weather; Accident costs; Visibility; Accident location; Property damage accidents; Injury statistics; Fatalities; Manpower utilization; Flow charts; Systems analysis

AVAILABILITY: NTIS

2/9 Traffic Control

HS-012 112 Fld. 2/9; 3/4

TRAFFIC CONTROL DECISIONS AND SELF-TESTING VALUES: PRELIMINARY NOTE

by J. M. Roberts; J. W. Hutchinson; C.

Published in *Traffic Engineering* v42 n11 p42-8 (Aug 1972)

7refs

Supported in part by the Smithsonian Institution.

This paper demonstrates that motivational and attitudinal differences among traffic engineers clearly bias some traffic control decisions and that such bias on the part of individuals, for or against certain controversial provisions, can actually be predicted. In 1971 a brief questionnaire was given to persons attending a traffic engineering seminar. The questionnaire was designed to distinguish between high and low self-testers and to provide a measure of each person's attitudinal profile with respect to a number of controversial issues in traffic engineering. Results showed that high self-testers, in contrast with low self-testers, preferred more use of right turn on red signs, rejected the idea that emergency vehicles should obey traffic rules, rejected the use of yield signs at entrance ramps, liked high speed driving and passing, believed that traffic conflict observation was more useful than accident record analysis, and thought that the lowest accident involvement would be at 10-12 mph above average speeds.

Search terms: Traffic engineering; Driver attitudes; Driver behavior; Driver personality; Decision making; Risk taking; Traffic control; Right turn on red; High speed; Accident factors; Driver psychological tests

3/0 HUMAN FACTORS

HS-012 093 Fld. 3/0

WHAT ARE TODAY'S TRAINING NEEDS?

by R. W. Burneson

Published in *Traffic Safety* v72 n7

Most present highway safety personnel need organized training in order that optimum benefit can be obtained from existing manpower and expenditures. Those areas of manpower development that need increased effort encompass legislation; organizational structure; program policies and priorities; project planning; system, program, and project management; funding; and official and public support. Specific recommendations are presented for five levels of activity, including: federal administrations; state highway traffic safety agencies; local governmental agencies; community groups, state organizations, and others interested in traffic safety, including individuals; and the private sector—support groups, national associations, foundations, and other agencies.

Search terms: Manpower utilization; Highway safety organization management; State action; Education; Federal aid; Federal state relationships; Community support; Local government

3/1 Alcohol

HS-012 074 Fld. 3/1; 3/6

A COMPARISON OF THE DRIVING RECORDS AND OTHER CHARACTERISTICS OF THREE ALCOHOL-INVOLVED POPULATIONS AND A RANDOM SAMPLE OF DRIVERS

by C. D. Clark

Published in *HIT Lab Reports* v2 n10 p1-5 (Jun 1972)

1ref
Contract FH-11-6555; FH-11-7129

This article compares selected demographic variables and the driving records of four populations: a random sample of Michigan driver license holders, driver fatalities, hospitalized alcoholics, and drunk-driving offenders. The results of

3/1 Alcohol (Cont'd.)

HS-012 074 (Cont'd.)

populations as compared to the number of female license holders; in terms of age distributions for each population, it appears that both the drunk driving arrestees and the hospitalized alcoholics tend to evidence their serious signs of problem drinking at a later age than that at which most fatal crashes occur. However, persons drinking heavily at the time of a fatal crash tend to be older than their nondrinking or less-extensively drinking counterparts. Although the data do not indicate that alcoholics, drunk-driving offenders, and heavily-drinking driver fatalities are the same on all variables, the measures of driving deviancy indicate that they may well be drawn from the same subpopulation of drivers.

Search terms: Driver records; Michigan; Driver fatalities; Alcoholism; Drinking drivers; Blood alcohol levels; Male drivers; Female drivers; Driver age; Traffic law violations; Accident rates; Problem drivers; Driver intoxication; Reckless driving; High risk drivers; Variance analysis

HS-012 096 Fld. 3/1

EFFECTS OF MODERATE BLOOD ALCOHOL LEVELS ON DRIVER ALERTNESS

by C. G. Keiper

Health Services and Mental Health Administration, H 07500

1972 16p 17refs
Report no. ICRL-RR-70-5; DHEW-(HSM)-72-10017

In this study of the effects of moderate blood alcohol levels (.065%) on driver alertness, clinically normal individuals drove in an optical driving simulator for uninterrupted periods of two hours. These subjects were required to maintain a specified speed and distance relationship to a preceding car, and to respond to an aperiodically appearing signal from their car's high-beam indicator. During the alcohol session, subjects not only exhibited significantly slower reaction times, but also failed to respond at all to a significantly larger number of the given signals. Increases in tracking errors as they drove down the roadway and a decrease in steering reversals indicated additional deleterious effects of the alcohol upon performance capacity. Results of this study suggest that the effects of moderate levels of blood alcohol must be examined not only as they affect simple perceptual-motor skills, but also as they may more subtly affect time-sharing capabilities and the various complex decision-reaction processes involved in operating a motor vehicle.

Search terms: Blood alcohol levels; Alcohol effects; Driver performance; Driver reaction time; Driving simulators; Car following; Steering reversals; Driver errors; Driver monitoring; Attention; Drinking drivers; Tracking

AVAILABILITY: GPO

HS-012 111 Fld. 3/1; 3/7

A STUDY ON ARRESTS AND DISPOSITION OF ALCOHOL-DRUGS AND DRIVING CASES IN NEW YORK STATE

by B. Newman; A. Dihrberg; J. Rivo

Published in *Police* p47-52 (Nov 1971)

Data from questionnaires sent to law enforcement agencies in New York State to evaluate the roles of the police, district attorneys, and magistrates in dealing with motorists arrested for drunk or drugged driving are presented. It is concluded that: apparent lack of communication among the police, district attorneys, and magistrates has caused a breakdown in dealing with these drivers; the administration of justice in these cases is too slow; the implied consent law should be amended to reduce the presumptive blood alcohol level from .15% to .10%; legislation should be enacted to make it obligatory to determine alcohol blood levels of victims in fatal auto accidents; the public must be made aware of the relationship between blood-alcohol levels and accidents; the principle of judicial notice for breath-testing apparatus should be recognized by magistrates; police should take more enforcement action against drunk and drugged drivers, before accidents occur; and research should be performed on the effects of drugs and driver safety.

Search terms: New York (State); Driver intoxication; Questionnaires; Police law enforcement responsibilities; Alcohol laws; Drug effects; Driver prosecution; Alcohol chemical tests; Arrests; Convictions; Acquittals; Blood alcohol levels; Drinking drivers; Problem drivers; Police cooperation with other agencies

3/4 Driver Behavior

HS-012 067 Fld. 3/4

HEART RATE VARIABILITY: A NEW INDEX OF DRIVER ALERTNESS/FATIGUE. FINAL REPORT

by J. F. O'Hanlon

Human Factors Res., Inc., H 21150

1971 73p 44refs
Contract FH-11-7684
Report no. 1712-1

This was an investigation of the relationship between heart rate variability (HRV) and driver performance, and a preliminary test of an experimental alertness indicator (EAI), i.e., a device for measuring HRV. Three drivers drove on a round-the-clock basis for five days over a 364-mile circuit on a California highway. HRV and driver error frequency

were recorded and analyzed to determine effects of driving time, rest breaks, traffic event frequency, and other variables. The results showed that HRV increased markedly with driving time; HRV recovered after rest; HRV might have reflected features of the highway's geometric configuration; HRV dropped substantially after the occurrence of events which re-alerted the drivers; and HRV was little influenced by traffic event frequency *per se*. It was concluded that HRV is related to driver alertness/fatigue and that the EAI has promise of being useful for estimating the level of driver alertness.

Search terms: Heart rate; Driver fatigue; Attention; Driver performance; Driver errors; Trip length; Rest pauses; Attention lapses; Driver behavior research; Driver physiological test devices; Instrumented vehicles; California; Road tests; Driver performance under stress; Driver emergency responses; Driving tasks

AVAILABILITY: NTIS

HS-012 071 Fld. 3/4; 3/6

A TWO YEAR FOLLOW-UP OF OFFICIAL ACTION TAKEN AGAINST PROBLEM DRIVERS

by D. H. Schuster

Iowa State Univ., I 48000

6p 6refs

Presented at the American Psychological Assoc. Convention, Washington, D.C. Sep 1971.

This study utilizes a nonlinear multivariate stepwise regression approach to predict the follow-up driving record of problem drivers 24 months after an individual driver improvement interview where official action was manipulated. Several interactional terms contributed more to the prediction of follow-up driving record than did the same variables separately in the multiple regression equations. The interactions terms are explainable theoretically on an expectancy basis with multiple chances for confirmation. These results are provocative for driving safety because they suggest that punitive action has just the opposite effect to that intended; i.e., severe action accorded a beginning problem driver has the effect of telling him that he is a problem driver and he drives accordingly. The converse also appears to hold.

Search terms: Problem drivers; Driver behavior; Driver records; Traffic law violations; Regression analysis; Penalties; Driver interviews; Traffic law violation forecasting; Accident risk forecasting; Driver license suspension; Driver improvement; Multivariate analysis

HS-012 088 Fld. 3/4

DRIVERS' BRAKE REACTION TIMES

by G. Johansson; K. Rumar

Published in *Human Factors* v13 n1 p23-7 (Feb 1971)

3refs

Sponsored by the Swedish National Road Safety Research Council.

The object of this investigation was to determine the distribution of brake reaction times which can be expected from drivers who have to brake suddenly and completely unexpectedly in traffic situations. The experiments were carried out as follows: brake reaction time was measured on a large group of drivers (321) in an anticipated situation on the road (brake reaction time 1); a group of five drivers was repeatedly tested in the same way (brake reaction time 2); the same small group was repeatedly tested in a surprise situation (brake reaction time 3); and the ratio of brake reaction time 3 to brake reaction time 2 was used as a correction factor and applied to brake reaction time 1. The corrected median of the resulting distribution was 0.9 sec.; 25% of the group was estimated to have a brake reaction time longer than 1.2 sec.

Search terms: Braking time; Driver reaction time; Driver emergency responses; Driving task analysis; Statistical analysis

HS-012 114 Fld. 3/4; 3/12

HAZARD PERCEPTION IN AUTOMOBILE DRIVERS: AGE DIFFERENCES

by S. M. Soliday; J. A. Allen, Jr.

North Carolina Univ. Hwy. Safety Res. Center, N 66000

1972 11p 8refs

Conducted as part of a larger project, Driver License Road Testing (DL-69-001 (002)) contracted with North Carolina Dept. of Motor Vehicles and sponsored by North Carolina Governor's Hwy. Safety Program. Prepared in cooperation with North Carolina State Univ.

A study was conducted to determine if automobile drivers of different ages preceive hazards differently while driving. Nine female subjects ranging in age from 23 to 29 years and 11 female subjects ranging from 17 to 22 drove over a predetermined course and reported all situations they thought to be hazardous. It was found that the two groups did indeed differ in their perceptual patterns. The younger group more often reported non-moving objects, such as bridges, parked vehicles, etc., to be potentially hazardous as opposed to moving objects, such as other vehicles and pedestrians. The older group, on the other hand, reported perceived hazards as stemming equally from both non-moving and moving objects. Measures of vehicle tracking revealed no differences between the groups.

HS-012 114 (Cont'd.)

Search terms: Hazard perception; Age factor in driving; Female drivers; Lane changing; Speed changes; Driver performance; Adolescent drivers; Young adult drivers; Adult drivers; Driver age; Tracking

HS-012 116 Fld. 3/4; 3/6

CHARACTERISTICS OF NORTH CAROLINA DRIVERS

by P. F. Waller; G. G. Koch

North Carolina Univ. Hwy. Safety Res. Center, N 66000

1971 30p

Supported in part by the Governor's Highway Safety Program.

A systematic sample of 956 records was pulled from the entire driver license file. Each of these drivers was sent a questionnaire requesting information concerning the amount and kind of driving they do, their education, occupation, and marital status, and how they learned to drive. They were also asked their opinions about the role of certain factors in highway safety. The sample was fairly representative of the entire licensed population in terms of age, race, and sex. Furthermore, the respondents were also fairly representative of these same variables. The data reported should be useful in interpreting statistics on accidents and violations, in that they provide some information concerning the amount and kind of driving done by different groups as well as the way in which exposure is related to the driving record. The information concerning the public's attitudes toward factors in highway safety provides clues to the kinds of programs that may be accepted more readily. The data also suggest a need for more effectively informing the public.

Search terms: Driver characteristics; North Carolina; Questionnaires; Driver age; Driver sex; Racial factors; Drinking drivers; Traffic law violators; Correlation analysis; Driver mileage; Driver attitudes; Marital status; Driver educational levels; Young adult drivers; Driver occupation; Driver records; Male drivers; Female drivers; Adult drivers; Accident risks

HS-012 118 Fld. 3/4

AGE AND SEX FACTORS IN THE CONTROL OF AUTOMOBILES

by S. M. Soliday; J. A. Allen, Jr.

North Carolina Univ. Hwy. Safety Res. Center, N 66000

1972 21p 4refs

Conducted as part of a larger project, *Driver License Road Testing* (DL-69-001 (002)), contracted with the North Carolina Dept. of Motor Vehicles and sponsored by North Carolina Governor's Hwy. Safety Office. Prepared in cooperation with North Carolina State Univ.

Forty volunteer drivers were formed into four groups on the basis of age and sex. The following variables were measured during test runs: total trip time, running time, miles traveled, speed changes, fine steering wheel reversals, accelerator reversals, and brake applications. In general, female subjects were found to make more speed changes and fine steering corrections than their male counterparts. Young females made substantially more fine steering reversals relative to young males, but only slightly more relative to the older men and women. The driving of males was somewhat smoother than that of females, if one uses number of speed changes and steering adjustments as criteria. With respect to the age variable, few differences were found. In general, over-30 drivers made a few more lane changes on the interstate course. The type of course driven was the most influential variable in the study, producing large differences with all six dependent variables.

Search terms: Driver sex; Driver age; Male drivers; Female drivers; Driver performance; Driver monitoring; Variance analysis; Speed changes; Lane changing; Steering reversals; Brake usage; Driver experience; Vehicle control; Test volunteers; Speed patterns; Automobile handling; Travel time; Acceleration; Young adult drivers; Driving conditions; Adult drivers

HS-012 106 Fld. 3/5; 3/3

SAFE MOTORCYCLE EDUCATION AND TRAINING MANUAL

by R. Garrene

Long Beach Safety Council, Inc.

1970 64p

Course outlines and lesson plans for the four week program are presented. Emphasis is on an appreciation of safety, the importance of proper riding techniques, defensive driving, and the development of skills in the utilization and handling of a motorcycle.

Search terms: Motorcycle operator education; Curricula; Motorcycle safety; Instruction manuals; Motorcycle handling; Motorcycle riding techniques; Defensive driving

AVAILABILITY: Corporate author $3.00

HS-012 120 Fld. 3/5

DRIVING AND ROADCRAFT REV. ED.

National Safety Council of Western Australia, N 27900

[n.d.] 112p

This manual has been adopted as the textbook and the basis of the instructor and driver training for the road safety and driver education program conducted in state and independent schools in Western Australia. The revised edition incorporates not only up to date driving and roadcraft techniques, but has additional sections for the benefit of novice drivers, for motorcyclists, and for those motoring on unfrequented roads.

Search terms: Driver education manuals; Australia; Instructor training; Motorcycle handling

HS-012 124 Fld. 3/5

AN ANALYSIS OF THE CONTENTS OF STATE DRIVER MANUALS

by H. C. Nuckols, Jr.

Clemson Univ., C48000

1972 84p 32refs

Master's thesis.

This study was conducted to determine the extent that each of the 51 state driver manuals covered the basic licensing and driving information a driver should know. The manuals were evaluated against a set of guidelines related to general handbook composition, driver license information, rules of the road, driver condition and preparation tasks, elements of the driving task, driving mancuvers, emergency situations, expressway driving, conditions of the driving environment, traffic accidents and financial responsibility, and the vehicle. The subjects with the lowest degree of coverage were driver condition and driver preparation tasks, conditions of the driving environment, and emergency situations. Recommendations are primarily directed toward correcting those areas of the driver manuals which were most deficient.

Search terms: Driver licensing; Traffic laws; Driving tasks; Driver emergency responses; Environmental factors; Financial responsibility; Freeway driving; Instruction manuals; Driving conditions; Vehicle maintenance; Accident factors; Intelligibility

3/6 Driver Licensing

HS-012 082 Fld. 3/6; 4/7

AN ANALYSIS OF THE CALIFORNIA DRIVER RECORD STUDY IN THE CONTEXT OF A CLASSICAL ACCIDENT MODEL

by D. C. Weber

Published in *Accident Analysis and Prevention* v4 n2 p109-16 (Jun 1972)

10refs

Supported in part by grants from the National Institutes of Health.

The results obtained in the 1964 California Driver Record Study are examined in the light of the classical Greenwood-Yule (1920) accident model and Kerrick's (1951) extension of this model. The Greenwood-Yule model successfully fits the accident data obtained in the study when applied to a given interval of time. However, Kerrich's extension of this model to two nonoverlapping time periods fails to achieve complete tenability in this instance under large sample scrutiny. In particular, his assumption of constant accident rate potentials over time appears violated. Nevertheless, Kerrich's bivariate negative binomial model qualifies as an approximate model for explaining the California data.

Search terms: Mathematical models; Accident rates; Accident risk forecasting; Mathematical analysis; Driver records; Binomial density functions; California; Accident repeater drivers; Confidence intervals

3/12 Vision

HS-012 113 Fld. 3/12; 3/6

INTER-EXAMINER RELIABILITY IN THE DETERMINATION OF LATERAL VISUAL FIELD

by D. E. Neil; T. R. Johns

North Carolina Univ. Hwy. Safety Res. Center, N 66000

1972 16p 1ref

Supported in part by the Governor's Hwy. Safety Prog.

The purpose of this study was to assess inter-examiner reliability in the use of the Bausch and Lomb peripheral vision-testing instrument. Four driver license examiners measured lateral visual field on 25 subjects under two illumination conditions utilizing a variation of the method of limits. Results of the investigation indicated that inter-examiner reliability was extremely high, and technique of taking the measurement and/or illumination did not appear to significantly influence inter-examiner reliability.

Search terms: Peripheral vision; Vision tests; North Carolina; Driver license examiners; Reduced visibility; Reliability; Variance analysis; Visual fields

HS-012 122 Fld. 3/12; 3/4

STRATEGIES OF VISUAL SEARCH BY NOVICE AND EXPERIENCED DRIVERS

by R. R. Mourant; T. H. Rockwell

Published in *Human Factors* v14 n4 p325-35 (Aug 1972)

9refs

Six novice male drivers aged 16-17 drove a 2.1-mi. neighborhood route and a

HS-012 122 (Cont'd.)

4.3-mi freeway route. Eye movements were videotaped. The visual behavior of a control group was also videotaped on the same routes. The results showed that the novice drivers concentrated their eye fixations in a smaller area as they gained driving experience; looked closer in front of the vehicle and more to the right; sampled their mirrors less frequently; and made pursuit eye movements on the freeway route while the experienced drivers made only eye fixations. These results suggest that the visual acquisition process of the novice drivers was unskilled, overloaded, and insufficient for detecting hazards. It is recommended that novice drivers be prohibited from driving on public roads until they achieve an acceptable level of vehicle handling control and develop skill in acquiring visual information.

Search terms: Adolescent drivers; Visual behavior; Driving task analysis; Eye movements; Visual perception; Driver experience; Videotapes; Driver monitoring; Freeway driving; Mirror usage; Male drivers; Hazard perception; Search performance; Variance analysis; Perceptual loads

4/0 OTHER SAFETY-RELATED AREAS

4/1 Codes and Laws

HS-800 722 Fld. 4/1; 3/3; 5/3

LAWS REQUIRING HELMETS AND EYE PROTECTION FOR MOTORCYCLISTS

by E. E. Yaw

National Comm. on Uniform Traf. Laws and Ordinances, N 14400

Published in *Traffic Laws Commentary* v1 n4 (Aug 1972)

16p refs
Contract DOT-HS-107-1-153

Recognition of the substantial vulnerability of persons operating or riding motorcycles has resulted in legislative efforts to reduce deaths and injuries by requiring cyclists to use devices to protect their heads and eyes. This commentary reviews these requirements in the context of comparable requirements of the Uniform Vehicle Code; indicates that state laws requiring use of such devices have generally been upheld by the courts; and briefly discusses the effect of not using helmets on the motorcyclist's right to receive compensation for his injuries. Forty-five states have laws requiring protective headgear for motorcyclists. Laws in 41 of these jurisdictions conform substantially with the UVC requirements. Thirty-four states have laws requiring eye protective devices for motorcycle operators. Laws requiring the use of motorcycle helmets have been upheld in at least 30 jurisdictions while being held invalid in only two.

Search terms: Uniform Vehicle Code; Headgear laws; Head protection; Eye protection; State laws; Motorcycle safety; Helmet standards; Court decisions; Negligence; Traffic law uniformity; Injury compensation

AVAILABILITY: GPO $0.30

HS-800 723 Fld. 4/1; 5/2

LAWS REQUIRING DRIVERS TO STOP FOR SCHOOL BUSES

by E. E. Yaw

National Comm. on Uniform Traf. Laws and Ordinances, N 14400

Published in *Traffic Laws Commentary* v1 n5 (Aug 1972)

62p refs
Contract DOT-HS-107-1-153

This commentary reviews state laws requiring drivers to stop for school buses in the context of comparable provisions in the Uniform Vehicle Code. The code provides that a driver must stop before reaching a school bus when four conditions are met: the bus is yellow in color; the bus displays school bus signs; alternately flashing red lights are in operation on the bus; and the bus is stopped. No jurisdiction conforms with all four Code requirements. Nine states do have laws with provisions similar to all of the Code requirements.

Search terms: Uniform Vehicle Code; State laws; School bus safety; Traffic law uniformity; School bus overtaking regulations; School bus signals; Yellow; Red lamps; Flashing lamps; Stop lamps; School bus standards

AVAILABILITY: GPO $0.60

4/2 Community Support

HS-810 240 Fld. 4/2; 3/1

REMARKS BEFORE THE FIRST ANNUAL WISCONSIN HIGHWAY SAFETY COORDINATOR'S ASSOCIATION CONFERENCE, APPLETON, WISCONSIN, OCTOBER 26, 1972

by C. H. Hartman

National Hwy. Traf. Safety Administration, N 19900

1972 16p

Wisconsin's highway safety program is described as a microcosm of the national program. State programs include special emphasis on enforcement, the Wisconsin Alcohol Safety Action Project, and emergency medical services. The NHTSA program is reviewed with emphasis on alcohol in relation to highway safety, selective traffic law enforcement, identification of problem drivers, and traffic engineering services in the implementation of highway safety standards.

Search terms: Wisconsin; Highway safety programs; Drinking drivers;

Alcohol Safety Action Projects; Traffic law enforcement; Federal state relationships; Federal aid; Traffic engineering; Problem drivers; Highway safety standards; Emergency medical services; Alcohol usage deterrents; Alcohol education; Driver identification

AVAILABILITY: NHTSA

4/4 Governmental Aspects

HS-810 241 Fld. 4/4

HOW TO APPLY FOR GRANTS

by C. H. Hartman

National Hwy. Traf. Safety Administration, N 19900

1972 12p

Presented at National Safety Congress, Chicago, 1 Nov 1972.

A description of the NHTSA grant administration program is presented. There are two main funding sources. Section 402 funds are grant dollars apportioned to the states according to statutory formula under the Highway Safety Act and are subject to a state matching arrangement. Section 403 funds are part of the NHTSA contract program under which 100% federally-funded projects for research and development, field or pilot testing, and countermeasure demonstrations are undertaken.

Search terms: Grants; Federal aid; Financing; Highway safety programs; Contracts; Federal state relationships; Highway Safety Act of 1966

AVAILABILITY: NHTSA

HS-810 242 Fld. 4/4; 3/5

HIGHWAY SAFETY PROGRAM STANDARDS: ARE WE WILLING TO ACCEPT CHANGE?

by C. H. Hartman

National Hwy. Traf. Safety Administration, N 19900

1972 24p

Presented at American Academy of Safety Education Annual Meeting, Chicago, 31 Oct 1972.

NHTSA is presently upgrading and reorganizing the highway safety program standards. The revision process was designed to accomplish the following purposes: upgrade the highway safety program standards issued since 1967 by incorporating countermeasure concepts which have been developed or refined during the intervening period; refine, and in some cases, establish, program evaluation requirements by which the states can determine program progress and quality and the NHTSA assess status of overall state progress toward implementation; employ performance-oriented language to a greater extent; and repackage the standards to make relationships more readily apparent and to aid states in developing and implementing coordinated, comprehensive highway safety programs. Two of the proposed standards, program administration and evaluation and traffic safety education, are discussed.

Search terms: Highway safety standards; Highway safety programs; Program evaluation; Federal state relationships; Manpower utilization; Safety education; Driver education standards; Seat belt usage laws; Safety standards compliance

AVAILABILITY: NHTSA

5/0 VEHICLE SAFETY

5/4 Design

HS-012 066 Fld. 5/4

ROLLOVER TESTING

by R. A. Wilson; R. R. Gannon

General Motors Corp., G 06600

1972 12p 11refs
Report no. SAE-720495

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

This paper presents a summary of rollover testing history; provides an analysis of field accident data relating to rollovers; and summarizes GM's recent experience with a new method of rollover testing.

Search terms: Dolly rollover tests; Rollover tests; Drop tests; Ejection; Crush tests; Roof failures; Injury severity; Accident simulation; Vehicle kinematics; Accident research; Ramp rollover tests; Deformation; Test equipment; History; Rollover accidents

AVAILABILITY: SAE

HS-012 068 Fld. 5/4; 4/7

CRASH DATA ANALYSIS

by G. G. Lim

Ford Motor Co., F 18600

1972 19p 1ref
Report no. SAE-720496

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A new technique for body/frame cars to predict the vehicle collapse, velocity, and deceleration histories in a barrier crash at any speed between 10 and 30 mph has been developed. This approach requires data interpolation from a minimum of two and preferably three barrier tests conducted with no additional instrumentation than that already present in today's standard testing. Potential savings could be derived from using this technique to reduce the number of barrier tests that would otherwise be

5/4 Design (Cont'd.)

HS-012 068 (Cont'd.)

necessary for checking safety restraint performance throughout the crash speed spectrum contained within the test boundaries. Good correlation with tests was obtained with the 1969 Ford car line. Application of this technique to the 1971 Mercury showed similar favorable results. Applicability of the equations to body/frame configurations other than those tested has not been determined.

Search terms: Barrier collision tests; Body tests; Frame tests; Head on impact tests; Impact velocity; Deceleration; Mathematical analysis; Body failures; Collapse; Low speed impact tests; Fords; Accident research

AVAILABILITY: SAE

HS-012 073 Fld. 5/4

URBAN VEHICLE DESIGN COMPETITION—HISTORY, PROGRESS, DEVELOPMENT

by V. S. Darago; C. M. McCuen

Massachusetts Inst. of Tech., M 15000

1972 13p 3refs
Report no. SAE-720497

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

The Urban Vehicle Design Competition was inspired by the success of the Clean Air Car Race and the Great Electric Car Race. The academic community recognized the tremendous educational value of these events, and encouraged development of UVDC from its inception. The project was designed by engineering students to benefit students throughout North America. The rules of the competition include technical paper requirements that make the competition extremely attractive to professors who wish to build a course around this theme. The response of more than 2000 engineering students at 80 universities throughout the United States and Canada has indicated the success of the structure of the competition. The first major objective of the UVDC project has been met. Ninety-three teams throughout the country entered the UVDC design portion of the contest. The second portion of the project is the prototype contest of August 1972. At this time, student-developed and modified vehicles will compete for UVDC honors as the best urban vehicle. Scoring procedures for entries are outlined.

Search terms: Experimental automobiles; Contests; Automobile design; Exhaust emission control; College students; Urban automobiles; Automobile urban usage; Automobile tests; Automobile performance

AVAILABILITY: SAE

HS-012 086 Fld. 5/4

EXPERIMENTAL SAFETY VEHICLES: WHERE DO WE GO FROM HERE?

Anonymous

Published in *Automotive Engineering* v80 n8 p19-27 (Aug 1972)

Developments in experimental safety vehicles in West Germany, Japan, Britain, Italy, France, and Sweden are described. These countries are working on safety subsystems for application to cars smaller than the American standard car. Aspects discussed are heavily padded passenger compartments, alternatives to the air bag such as a passive shoulder belt and knee restraint system, crashworthy bodies.

Search terms: Experimental automobiles; Safety cars; West Germany; Japan; Great Britain; Italy; France; Sweden; Foreign automobiles; Shoulder harnesses; Air bag restraint systems; Knee restraints; Occupant protection; Padding; Automobile safety characteristics; Compact automobiles; Crashworthy bodies; Crashworthiness; Passenger compartments; Automatic seat belts

HS-012 092 Fld. 5/4

VEHICLE SOUND PACKAGE—ART OR SCIENCE?

by J. R. Peart; T. V. Huber

Ford Motor Co., F 18600

1972 5p 1ref
Report no. SAE-720508

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Sound package engineering has always been an art developed through experience and much subjective road testing. Because the problem is complex, it is essential to have a logical procedure to achieve the most efficient sound package. The quiet car concept is proposed as a solution. Additionally, a plea is made for relevant automobile-oriented material test procedures to be recognized industry-wide.

Search terms: Sound absorbing materials; Sound dissipation; Noise control; Automobile interior design; Acoustic measurement; Vehicle noise

AVAILABILITY: SAE

HS-012 094 Fld. 5/4; 5/6

THE LITTLE ENGINE THAT COULD BE AN ANSWER TO POLLUTION

by G. Alexander

Published in *New York Times Magazine* p18-25 (3 Oct 1971)

This article briefly traces the development and improvement of the Wankel engine, and discusses the feasibility of its use in American cars. A piston engine and a Wankel engine are described and compared. The main advantages of the Wankel engine are its compact size, its high power-to-weight ratio, and its adaptability to the use of thermal reactors or catalytic converters to reduce exhaust emissions.

Search terms: Wankel engines; Piston engines; Engine design; Engine performance; Exhaust emission control; Apex seals; Fuel economy; Otto cycle engines; Rotary engines

HS-012 099 Fld. 5/4

PRINTED CIRCUIT SWITCHES FOR AUTOMOTIVE APPLICATIONS

by S. Lemon; G. Galbraith

AMP, Inc. A 46200; Ford Motor Co., F 18600

1972 8p
Report no. SAE-720512

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Automotive emphasis on reliability and reduced warranty costs is opening up new concepts in printed circuit switches. The economy of using a printed circuit board to provide electrical interconnections between circuits also provides consistency in high production, reduces labor, and the number of manufacturing operations. The printed circuit board approach offers the creative design engineer increased freedom in design approach since the printed circuit board is a structural member as well as an insulator with selective electrical circuitry. It is possible to use the printed circuit for contacts and minimize the number of electrical interfaces; however, each design must be evaluated on an individual basis. Printed circuit switches also offer an extension of printed circuit connector technology, connecting directly to the printed circuit board. Printed circuit connectors are easily attached on assembly line for fast, reliable electrical connections.

Search terms: Switches; Electric systems; Reliability; Connectors; Printed circuits; Performance tests

AVAILABILITY: SAE

HS-012 101 Fld. 5/4

USE OF CONDUCTIVE ELASTOMERS IN HARD BACK PRINTED CIRCUIT SWITCHES

by P. J. Blinkilde

Essex International, Inc., E 19500

1972 6p
Report no. SAE-720513

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

This paper discusses Pressex as a switching material, and describes how its use can overcome the limitations of conventional on-circuit switch design, such as failure due to mechanical wear and/or electrical erosion. Pressex is a rubber-like compound which can be formulated to be an insulator in its free state and a highly efficient conductor when compressed.

Search terms: Switches; Pressex; Wear; Electric properties; Mechanical properties; Printed circuits; Elastomers

AVAILABILITY: SAE

HS-012 103 Fld. 5/4

DESIGNING CLAD METALS FOR CORROSION CONTROL

by R. Baboian

Texas Instruments, Inc., T 18600

1972 9p 6refs
Report no. SAE-720514

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

The choice of material for a particular application depends on many factors, including cost, availability, appearance, strength, fabricability, and corrosion resistance. Frequently, use of a monolithic metal is compromised by one or more of its properties. The metallurgical materials systems concept provides a means of designing specific properties into a single composite material. Two or more metals are bonded at the atomic level to form a clad metal that meets the precise requirements of a specific application. In this report technical factors involved in designing corrosion-resistance materials systems are considered. Advantages and limitations are discussed and specific automotive engineering applications are used.

Search terms: Composite materials; Corrosion resistance; Galvanic corrosion; Automobile materials; Clad metals; Materials tests; Corrosion prevention; Bonding

AVAILABILITY: SAE

HS-012 104 Fld. 5/4; 5/6

VARIABLE VALVE-TIMING UNIT SUITABLE FOR INTERNAL COMBUSTION ENGINES

by G. E. Roe

Published in *Institution of Mechanical Engineers Proceedings* v186 n23 p301-6 (1972)

2refs

5/4 Design (Cont'd.)

HS-012 104 (Cont'd.)

As the specific power output of I.C. engines is increased, the range of engine speed over which useful torque is available is reduced. This power band can be widened by having automatically varying valve timing, with the timing being a function of engine speed and/or load. A prototype cyclic phasing unit has been tested which successfully varies the timing of a poppet valve with opening, closing points, and the form of valve lift curve being readily varied independently. The unit is simple mechanically, but ideally one unit is needed for each valve, so principal application is likely to be on engines with a small number of cylinders. In addition to flattening the torque curve, such a unit is likely to give improved fuel consumption and lower exhaust emissions, particularly hydrocarbons.

Search terms: Internal combustion engines; Valve timing; Poppet valves; Exhaust emission control; Fuel consumption; Cams; Camshafts; Crankshafts; Engine speeds; Epicyclic engines

HS-012 105 Fld. 5/4

ALUMINUM STRIPED STAINLESS TRIM FOR PREVENTION OF AUTO BODY GALVANIC CORROSION

by J. M. Beigay; D. R. Zaremski

Allegheny Ludlum Industries, Inc., A 20390

1972 10p 1ref
Report no. SAE-720515

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Laboratory and service tests were conducted to investigate the galvanic effectiveness of potential galvanic corrosion preventive systems. Results of the study indicate that: decorative automotive trim components of stainless steel do not produce accelerated galvanic corrosion of car body steel except in areas where the protective car body paints are damaged; the galvanic corrosion problem can be either totally eliminated or greatly minimized by applying various sacrificial coatings to the return flange of the stainless steel trim component or by electrically insulating the trim member from the car body; and the most effective galvanic corrosion preventive systems are metallic aluminum and zinc-rich paint applied to the return flange surface of the trim member.

Search terms: Galvanic corrosion; Corrosion tests; Aluminum; Corrosion inhibitors; Trim; Stainless steels; Corrosion prevention; Coatings; Laboratory tests; Zinc; Carbon steels; Automobile bodies; Paints

AVAILABILITY: SAE

HS-012 115 Fld. 5/4

THE COLD CRANKING SIMULATOR AND BRITISH ENGINE CRANKING STUDIES

by R. Hollinghurst; C. E. S. Hackett; K. Marsden; R. A. Wright

Mobil Oil Co. Ltd. (England), M53900; Esso Chemicals Ltd. (England), E20300; Perkins Engines Ltd. (England), P13650

1972 11p 6refs
Report no. SAE-720526

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

This paper presents a summary of studies initiated by the British Technical Council to examine the repeatability and reproducibility of cold crank simulator results obtained on European cross-diesel engines, and also to relate the results obtained to actual cranking speeds. The study of various components of engine cranking resistance on low-temperature starting behavior confirms that only those having oil viscosity dependence are related to temperature. Results obtained on engine startability and the cranking of used lubricants show significant increases in cranking speed as a result of fuel dilution, but show the converse for high insoluble contents (up to 10%). An advantage in cold startability is shown for the low end of the 20W specification compared to the high, but magnitude depends very much on the individual engine. Good correlation was obtained between the cold crank simulator results and the cranking tests on the gasoline engine at +10 F and diesel engine at -10 F, using the various selected oils, including the widely used 20W/50 multigrades.

Search terms: Coldstarts; Cranking; Cold weather starting; Lubricating oil tests; Viscosity; Test equipment; Physical properties; Diesel engines; Engine operating conditions; Variance analysis; Low temperature fluidity; Engine speeds; Laboratory tests

AVAILABILITY: SAE

HS-012 119 Fld. 5/4

FRICTION BEHAVIOR OF CLUTCH-FACING MATERIALS: FRICTION CHARACTERISTICS IN LOW-VELOCITY SLIPPAGE

by T. Bunda; A. Fujikawa; K. Yokoi

Toyota Motor Co. Ltd. (Japan), T30000

1972 7p
Report no. SAE-720522

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A study was made of details of friction characteristics of several kinds of clutch-

particular attention given to the low-speed slip area, the following was made clear: There exists a thin film on the friction surfaces of facing and mating materials. A thin film is presumed to be a visco-elastic substance which is susceptible to momentum and affects, to a great extent, friction and wear characteristics.

Search terms: Clutch facings; Friction tests; Resins; Coefficient of friction; Asbestos; Slip; Thin films; Wear

AVAILABILITY: SAE

HS-012 121 Fld. 5/4

FRICTION AND WEAR OF PAPER TYPE WET FRICTION ELEMENTS

by A. E. Anderson

Ford Motor Co., F18600

1972 9p 10refs
Report no. SAE-720521

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A simple model of the engagement process for paper friction materials has been conceived, consisting of squeeze film, squash film, and adhesive contact phases. In support of the model, laboratory test results are presented of paper clutch squeeze and squash film behavior in a new laboratory test fixture. Also scanning electron microscope photographs, profilometer data, and clutch inertia dynamometer friction and wear results are discussed in the context of the new engagement model. The techniques are used in materials testing for automatic transmissions.

Search terms: Automatic transmissions; Clutch plates; Clutches; Dynamometers; Friction materials; Scanning electron microscopes; Wear tests; Lubricating oils; Friction tests; Laboratory tests; Profilometers; Simulation models; Materials tests; Papers; Films (coatings)

AVAILABILITY: SAE

HS-012 125 Fld. 5/4

CHARACTERISTICS OF MULTIPLE RANGE HYDRO-MECHANICAL TRANSMISSIONS

by E. Orshansky; W. E. Weseloh

Orshansky Transmission Corp., O20550; Rohr Industries, R19900

1972 13p 5refs
Report no. SAE-720724

Presented at National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

The purpose of this paper is to show the advantages of multirange hydromechanical transmissions and to show some basic relationships of primary design parameters. Hydromechanical transmissions can be designed so that they maintain a high efficiency over a wide range of torque/speed variations. The amount of volumetric loss and, therefore, slip, can be reduced to a minimum; therefore, it is possible to control the speed of the powerplant by proper ratio control. The powerplant and transmission can be considered as one system which is permitted to operate, under optimum conditions, irrespective of the road load or speed of the vehicle.

Search terms: Transmission design; Torque; Speed control; Slip; Diesel engines; Turbine engines; Noise control; Hydraulic torque converters; Hydrostatic transmissions; Clutches; Planetary gear trains; Hydromechanical transmissions; Engine speeds; Variable ratio gears

AVAILABILITY: SAE

HS-012 127 Fld. 5/4; 2/7

KOOL PAK—A HIGH-CAPACITY, QUIET, THERMOSTATICALLY MODULATED COOLING SYSTEM FOR MOBILE VEHICLES

by J. R. Pharis

McQuay Perfex, Inc., M19300

1972 6p
Report no. SAE-720715

Presented at National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

Anticipating increasingly firm noise legislation and higher engine horsepowers, a complete cooling system has been developed for mobile vehicles that shows considerable promise as a method of efficiently and quietly cooling engines of high horsepower. This system, consisting of a fan, fan drive, and radiator, features thermostatic modulation of the fan, a low velocity, quiet air-moving method, low fan horsepower, and a conventional radiator with a high-capacity core. The remote aspect gives the vehicle manufacturer freedom to use a radiator of unconventional size and shape, and flexibility to encapsulate various noise-producing components of the vehicle.

Search terms: Cooling systems; Fans; Radiators; Noise control; Hydraulic equipment; Cooling system design; Kool Pak

AVAILABILITY: SAE

HS-012 128 Fld. 5/4; 4/3

ECONOMIC FACTORS IN RADIATOR SELECTION

by N. A. Cook

Modine Mfg. Co., M55150

5/4 Design (Cont'd.)

HS-012 128 (Cont'd.)

1972 5p 2refs
Report no. SAE-720714

Presented at National Combined Farm, Construction, and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

This paper presents an analysis of the optimum radiator size for a given cooling load considering three types of cores. The sum of the first cost and operating cost is analyzed on the basis of return on investment using the method of discounted cash flow. An analysis of a standard line of radiators showing the relationship of total owning and operating cost versus engine cooling load is also presented. Total useful operating life is shown as well as operating hours per year.

Search terms: Radiators; Economic factors; Cooling systems

AVAILABILITY: SAE

HS-012 129 Fld. 5/4

EXPERIMENTAL SAFETY VEHICLES: U. S. DESIGNS AND INNOVATIONS

Anonymous

Published in *Journal of Automotive Engineering* v80 n9 p30-7 (Sep 1972)

The four U. S. experimental safety vehicles by AMF, Fairchild, Ford, and General Motors, all designed to meet the Department of Transportation specifications for a 5-passenger, 4,000-lb family sedan, are described. Specific safety design features of each, such as energy absorbing bumpers, crashworthy bodies, suspension systems, occupant protection systems, energy absorbing materials, and structural modifications are given.

Search terms: Safety cars; Body design; Air bag restraint systems; Impact attenuation; Brake system design; Suspension systems; Crashworthy bodies; Instrument panel design; Safety design; Occupant protection; Frame design; Engine design; Experimental automobiles; Energy absorbing systems; Energy absorbing materials

HS-012 131 Fld. 5/4; 4/7

DESIGN AND DEVELOPMENT OF A HIGH HORSEPOWER TORQUE SENSING VARIABLE SPEED DRIVE

by D. L. Keller; R. E. Wilson

Allis Chalmers, A21600

1972 8p 1ref
Report no. SAE-720709

Presented at National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

The objectives of this investigation were to determine: the effect of the independent variables on the drive design parameters; verification of Dayco's equations in predicting the design parameters of a torque-sensitive design; and coefficients of friction for various cam surfaces, and various belt construction to cast-iron sheaves. Conclusions were: different belt constructions result in different belt to sheave coefficients of friction; fiberglass cords reduce the amount of belt elongation under heavy output loads; field operating conditions, due to sand particles and other foreign materials becoming embedded in the side of the belt, can reduce the coefficient of friction nearly 48%; the wrapped cover belt requires more driver axial force to transmit similar loads than the wrapped cover-notched belt; as-cast cam actuators provide good ramp surfaces; reducing the cam actuator ramp angle will increase the torque-sensing aggressiveness of the drive; Dayco's equations predict total tension and driven axial force with a high degree of agreement. The driver axial force equation provides good agreement, except under conditions of excessive driver slip.

Search terms: Belt drive design; Torque; Variable speed drives; Cams; Sheaves; Belts; Coefficient of friction; Equations; Loads; Fiberglass; Stress (mechanics)

AVAILABILITY: SAE

5/5 Door Systems

HS-012 064 Fld. 5/5

DEVELOPMENT AND ANALYSIS OF DOOR SIDE-IMPACT REINFORCEMENTS

by J. S. Haynes

Chrysler Corp., C42600

1972 8p
Report no. SAE-720494

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A door side-impact reinforcement beam has been developed that allows efficient use of material in resisting side crush loads. The beam section can be roll formed, thus permitting further economies in fabrication. Analytical techniques have been developed that evaluate and handle bending, buckling, and crippling in beam design. This paper covers the development that led up to these results and includes a detailed description of how to apply the analytical methods.

Search terms: Impact protection; Side impact bars; Side impact tests; Stress analysis; Bending; Deformation; Beams; Crushing; Beam tests

AVAILABILITY: SAE

5/6 Fuel Systems

HS-012 075 Fld. 5/6

EXHAUST EMISSION LEVELS OF IN-SERVICE VEHICLES—COMPARISON OF 1970 AND 1971 SURVEYS

by F. L. Voelz; E. C. Coleman; J. S. Segal; B. G. Gower

Atlantic Richfield Co., A72550

1972 9p 4refs
Report no. SAE-720498

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

The results of a nationwide automobile exhaust emission survey conducted in 1971 are presented and compared to data obtained from a 1970 survey. Average hydrocarbon and carbon monoxide emissions are given for engine speeds of idle and 2500 rpm. Vehicle distribution curves for hydrocarbon and carbon monoxide emissions are shown for the 1971 data for selected year groups based on emission control devices. Comparison of the distribution curves obtained from the 1971 and 1970 data show that deterioration (increased emissions) occurred at both idle and 2500 rpm in the one year period. The effects of carburetor adjustments on idle emissions are compared for the 1971 and 1970 data.

Search terms: Exhaust emissions measurement; Hydrocarbons; Carbon monoxide; Exhaust emission control devices; Exhaust emissions sampling; Exhaust emission tests; Idling; Engine speeds; Carburetors; Automobile maintenance; Statistical analysis; Vehicle age

AVAILABILITY: SAE

HS-012 077 Fld. 5/6; 5/11

CAR MAINTENANCE EXPENSE IN OWNER SERVICE WITH LEADED AND NONLEADED GASOLINES

by J. S. Wintringham; A. E. Felt; W. J. Brown; W. E. Adams

Ethyl Corp., E21600

1972 17p 14refs
Report no. SAE-720499

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Maintenance expenses when using leaded and nonleaded gasolines are reported from a five year program encompassing over 10 million miles of operation by 64 matched pairs of cars. The data are analyzed on a fuel-related basis for those items of maintenance that might be expected to be affected by the presence or absence of lead antiknocks. Year-by-year breakdowns of important costs are presented. This program provided data to support the following conclusions: the use of leaded gasoline resulted in a fuel-related maintenance cost of 0.066¢/mile more than the use of nonleaded gasoline; cars using leaded and nonleaded gasoline got essentially the same fuel economy; valve problems occurred when using both leaded and nonleaded fuels; the difference in fuel-related maintenance costs between the two fuel types did not continue to increase over the five year period; the overall total maintenance and tire replacement costs ranged from 1.29 to 1.60¢/mile.

Search terms: Leaded gasoline; Lead free gasoline; Automobile maintenance; Maintenance costs; Exhaust systems; Engine wear; Fuel economy; Gasoline mileage; Spark plugs; Fuel filters; Positive crankcase ventilation valves; Gasoline consumption; Automobile repair costs; Vehicle mileage; Vehicle operating costs; Engine operating conditions

AVAILABILITY: SAE

HS-012 079 Fld. 5/6

ADDITIVES CAN CONTROL COMBUSTION CHAMBER DEPOSIT INDUCED HYDROCARBON EMISSIONS

by R. P. Doelling; A. F. Gerber; P. M. Kerschner; M. S. Rakow; F. H. Robinson

Cities Service Oil Co., C44400

1972 12p 17refs
Report no. SAE-720500

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

An investigation was undertaken to determine if gasoline additives could effect a reduction in exhaust HC emissions. Of the multitude of compounds studied, two were found to reduce the increase in HC emissions associated with the accumulation of lead-derived combustion chamber deposits by approximately 50%. A practical combination of these compounds was evaluated in a fleet test which confirmed laboratory engine results. Studies were also conducted in laboratory engines and fleet vehicles to determine the effect of fuel lead level upon this additive's effectiveness and the activity of the additive upon established lead-derived combustion chamber deposits. Results obtained from these programs indicated that the additive would function with fuel lead levels from 1/2-3 g/gal, but that it was not capable of modifying established deposits. A rationale for the observed effect is presented.

Search terms: Fuel additives; Hydrocarbons; Combustion chamber deposits; Exhaust emission control; Exhaust emission tests; Leaded gasoline; Exhaust emissions measurement; Lead; Laboratory tests; Road tests

AVAILABILITY: SAE

5/6 Fuel Systems (Cont'd.)

HS-012 095 Fld. 5/6

LOW NOx EMISSIONS FROM AUTOMOTIVE ENGINE COMBUSTION

by J. G. Hansel

Esso Res. and Engineering Co., E21000

1972 10p 12refs
Report no. SAE-720509

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A wide range of air/fuel ratios and exhaust gas recycle rates were examined in an automotive test engine for the purpose of reducing NO_x emissions to low levels. A minimum NO_x level of 0.4 g/mile on the 1972 Federal Test Procedure was obtained at a rich A/F of 12 and a recycle rate of 25%. With this combination, the fuel consumption increased approximately 15% and the wide open throttle power decreased about 30%. Combustion in the cylinders was good and the vehicle operated smoothly. Comparable results were not obtained with lean mixtures. The results of this study do not establish the feasibility of meeting the 1976 NO_x standard with the rich mixture, high recycle technique. Further, the increased CO and HC emissions would have to be controlled by exhaust gas treatment.

Search terms: Nitric oxide; Air fuel ratio; Exhaust gas recirculation; Exhaust emission control; Exhaust emission tests; Lean fuel mixtures; Rich fuel mixtures; Exhaust emissions measurement; Fuel consumption; Power loss; Chassis dynamometers; Spark timing; Engine operating conditions; Stoichiometry

HS-012 097 Fld. 5/6

FIELD TEST OF AN EXHAUST GAS RECIRCULATION SYSTEM FOR THE CONTROL OF AUTOMOTIVE OXIDES OF NITROGEN

by J. C. Chipman; J. Y. Chao; R. M. Ingels; R. G. Jewell; W. F. Deeter

California Air Resources Board, C01200; Atlantic Richfield Co., A72550

1972 13p 10refs
Grant 68A0605D
Report no. SAE-720511

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

The California Air Resources Board conducted an extensive field test program to evaluate a vehicle exhaust recirculation system for control of oxides of nitrogen. The system utilized hot exhaust gases from the crossover and included certain modifications to the carburetion, choke, and crank case ventilation system. It was tested on two fleets of automobiles equipped with California approved HC and CO emission control devices. The test program involved periodic measurements of exhaust emissions and fuel consumption. The effect of the system on vehicle drivability, engine deposits, wear, and oil deterioration was also studied. The Atlantic Richfield Company, under contract to the Air Resources Board, equipped the vehicles with the recirculation system and performed the final engine inspection.

Search terms: Field tests; Nitrogen oxides; Exhaust gas recirculation; Exhaust emission control device tests; Exhaust emission tests; Driveability; Engine deposits; Engine wear; Carburetors; Hydrocarbons; Carbon monoxide; Exhaust emissions measurement; Gasoline consumption; Engine modification; Crankcase ventilation systems

HS-012 107 Fld. 5/6

FUEL INJECTION AND EGR ADJUSTMENTS ON THE RENAULT R17 TS

by C. Henault

Regie Nationale des Usines Renault (France), R06000

1972 8p 4refs
Report no. SAE-720518

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Because of low nitrogen oxide emissions, a version of the Renault R17 TS equipped with a high-performance engine was selected for the American market. This paper discusses problems encountered in adapting a Bosch electronic fuel injection system to a 1600 cm^3 engine to meet American standards up to 1974. The principal problems solved were those posed by intermediary operating speeds. This study also gives an idea of the pollution limits which can be obtained with an injection system which incorporates various important adjustment factors. Engine specifications are presented, as are descriptions of the electric regulation, electric and pneumatic coldstart, and fuel feeding circuits. The various modifications to the engine are also described.

Search terms: Renaults; Electronic fuel injection; Exhaust gas recirculation; Exhaust emission control devices; Nitrogen oxides; Fuel systems; Injection timing; Engine performance; Emission standards; Engine speeds; High powered engines

AVAILABILITY: SAE

HS-012 109 Fld. 5/6; 4/7

ANALYTICAL EVALUATION OF A CATALYTIC CONVERTER SYSTEM

General Motors Corp., G06600

1972 36p 29refs
Report no. SAE-720520

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Performance of packed bed type catalytic converters in controlling hydrocarbon (HC)-carbon monoxide (CO) mass emissions is investigated using a one-dimensional plug flow math model. Converter operation is explained, and the effects that some gas stream conditions and basic parameter values have on converter emission control performance during warmup are evaluated. It is shown that total mass emissions passed by the converter during warmup can be minimized by maintaining gas mass flow and HC-CO concentrations at low values. Converter warmup performance is highly sensitive to changes in bead diameter and catalyst kinetics, but it is relatively insensitive to changes in bed area/length ratio and bed void fraction. New information is presented dealing with the modeling of platinum kinetics, bead temperature stability, and mass and heat transfer j-factors for packed beds.

Search terms: Catalytic converters; Exhaust emission control devices; Carbon monoxide; Hydrocarbons; Mathematical models; Steady state; Exhaust gases; Reaction kinetics; Gas mixtures; Platinum; Oxidation; Mass transfer; Heat transfer; Catalyst tests

AVAILABILITY: SAE

5/7 Glazing Materials

HS-012 085 Fld. 5/7; 5/23

INTERIOR WINDOW FOGGING—AN ANALYSIS OF THE PARAMETERS INVOLVED

by A. R. Peters

Nebraska Univ., N36300

1972 13p 14refs
Report no. SAE-720503

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

Many factors are directly related to the occurrence of window fogging and flash fogging. The pertinent variables affecting the problem are identified and discussed. In simple terms, fogging is dependent upon the difference between the dew point temperature of the interior environment and the glass surface temperature. Several dew point and glass temperature curves have been computed which typify various operating conditions. Alternatives that will help to eliminate fogging are discussed.

Search terms: Window fogging; Air conditioning; Ambient temperatures; Defrosters; Heaters; Heat transfer; Moisture content; Windshields; Dew point; Thermodynamic properties; Respiration; Humidity; Hygroscopic properties; Windows; Mathematical analysis; Environmental factors

AVAILABILITY: SAE

5/9 Inspection

HS-012 110 Fld. 5/9

WEAK POINTS OF CARS

Svensk Bilprovning A.B. (Sweden), S53400

1972 36p

Svensk Bilprovning A.B. is responsible for the compulsory periodic inspection of motor vehicles in Sweden. This report concerns the company's activities during the first quarter of 1972. During this period 603,000 passenger cars and 38,000 trucks were inspected. Of the passenger cars 63% had various kinds of faults. The fault frequency was higher for the trucks than for the passenger cars. The main part of the report deals with the faults noted on the 1965-1970 year models of passenger car. The statistics include 24 different makes and types of passenger cars. For each type of vehicle the occurrence of defects is stated for 28 components and a comparison is made with the corresponding average passenger car.

Search terms: Automobile defects; Vehicle inspection; Vehicle age; Automobile models; Vehicle mileage; Inspection records; Foreign automobiles; Sweden; Defective vehicles; Statistical analysis; Truck defects

5/10 Lighting Systems

HS-012 081 Fld. 5/10

AUTOMOTIVE LAMP OUTAGE DETECTION

by F. J. Scharf

Lake Center Industries, L01600

1972 27p 4refs
Report no. SAE-720501

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

A presentation of potential solutions for detecting and indicating failed exterior automotive running lamps is provided. Comments and summaries of research in the areas of reed switches, photocells, magnetics, and electronic devices are given. Basic design specifications are established along with the posing of other significant system design criteria that must be resolved by automotive companies or safety requirements. The electromagnetically actuated reed switch best satisfies the design requirements for a stable, economical, and usable system. Comprehensive theoretical reed relay systems are presented and their impact on the automotive electrical system is discussed.

Search terms: Lamp failure detectors; Running lamps; Electric systems; Reed switches; Headlamps; Taillamps; Electronic monitoring systems

AVAILABILITY: SAE

5/10 Lighting Systems (Cont'd.)

HS-012 083 Fld. 5/10

ELECTRONIC LAMP MONITORING

by J. W. McNamee; S. B. Marshall

General Motors Corp., G06600; Sprague Electric Co., S36300

1972 6p
Report no. SAE-720502

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

In describing the electronic lamp monitoring system developed at Packard Electric Div. of General Motors Corp., this paper discusses the requirements of lamp monitoring systems, presents a brief history of such systems at Packard Electric, explains how the system functions, and details the method of assembling the system into General Motors automobiles. The requirements for a lamp monitoring system are: it should be able to monitor all types of exterior lamps on the automobile, and the number of lamps must not be critical to design; it must be easy to assemble; it should be simple in design so that it can be repaired in the field with minimum training of personnel; it must be reliable and able to withstand the electrical and environmental conditions to which the vehicle is subjected; there should be minimal change from one car line to another and from one model year to another; and most importantly, the unit cost should be reasonable.

Search terms: Lamp failure detectors; Fiber optics; Integrated circuits; Transistors; Electronic monitoring systems; Amplifiers

AVAILABILITY: SAE

5/14 Occupant Protection

HS-012 069 Fld. 5/14

ACCEPTANCE TESTS OF VARIOUS UPPER TORSO RESTRAINTS

by J. J. Swearingen

Federal Aviation Administration, F04000

1971 15p 17refs
Report no. FAA-AM-71-12; AD-726 253

This study demonstrates that people can be motivated to utilize and, in fact, eagerly accept the use of upper torso restraint equipment for the prevention of head and chest injuries induced by flailing during crash decelerations, provided that specific design criteria are followed by structural engineers. By giving attention in this study to design of specially constructed restraint equipment to incorporate the maximum in features for comfort, neatness of appearance, ease of stowage, and ease of donning and escape, it was found that over 90% of the test subjects utilized these upper torso restraint systems throughout the two-year test period. In contrast, only an estimated 3 to 5% utilization of the factory-installed torso restraint equipment in over 10,000,000 automobiles manufactured since January 1, 1968 has been attained to date.

Search terms: Restraint system design; Shoulder harnesses; Seat belts; Three point restraint systems; Restraint system usage; Questionnaires; Consumer acceptance

AVAILABILITY: NTIS

HS-012 070 Fld. 5/14

A CONTROLLED STUDY OF THE EFFECT OF TELEVISION MESSAGES ON SAFETY BELT USE

by L. S. Robertson; A. B. Kelley; B. O'Neill; C. W. Wixom; R. S. Eiswirth; W. Haddon, Jr.

Insurance Inst. for Hwy. Safety, I36000

1972 20p 24refs

A set of television messages based on the findings of a preliminary study of factors associated with actually observed use of safety belts was produced and shown on one cable of a dual cable television system for nine months. Observations of actual use of safety belts were obtained before and throughout the study period. The automobiles in which safety belt use was observed were matched to the households of experimental and control cables through license numbers, motor vehicle registry files, and the cable company files. The television messages had no effect whatsoever on safety belt use. This study adds to the growing body of evidence that a behavior modification approach is an inefficient and often ineffective means of reducing highway losses. Passive approaches, those which reduce the frequency and severity of damage to people and property irrespective of voluntary action, show greater promise of reducing highway losses.

Search terms: Seat belt usage; Driver behavior research; Driver monitoring; Television; Seat belt campaigns; Safety program effectiveness; Driver motivation; Safety propaganda; Driver sex; Injury prevention

HS-012 078 Fld. 5/14

CRASH TESTS OF CAR SAFETY RESTRAINTS FOR CHILDREN

Anonymous

Published in *Consumer Reports* v39 n8 p484-9 (Aug 1972)

2refs

Fifteen children's seats, one infant carrier, and one child's harness were

ested using a deceleration sled that rashed into a fixed barrier. All 15 seats ested bore a label certifying compliance ith Federal Motor Vehicle Safety tandard 213. For each crash test, a hild restraint was secured to the auto eat, according to the manufacturer's nstructions. A dummy representing a hree-year-old child was placed into each hild restraint, also according to its nanufacturer's instructions. Accelerometers in the dummy's head and hest measured deceleration upon mpact. The restraint systems were considered effective if decelerations were ufficiently low and spread over a sufciently large area of the body, away rom the abdomen, and if the dummy's ead did not hit the instrument panel. welve of the restraints tested were ated not acceptable. Only one met all of ne safety criteria for front, rear, and de impacts. Descriptions and ratings of ne child restraints tested are included.

Search terms: Restraint system tests; Safety standards compliance; Impact tests; Child safety seats; Child seat belts; Infant restraint systems; Restraint system effectiveness; Dummies; Harnesses; Impact sleds; Deceleration

IS-012 080 Fld. 5/14; 1/2

ESTIMATING THE EFFECTS OF RASH PHASE INJURY COUNTERMEASURES—1. THE REDUCTION OF THE FATALITY RISK

y H. C. Joksch; H. Wuerdemann

ublished in *Accident Analysis and revention* v4 n2 p89-108 (Jun 1972)

7refs
Contract FH-11-7228

Complete report available from NTIS as PB-191 209.

his paper studies crash types and injury ources; assesses the effects of countermeasures both individually and in combination; and determines the reduction in fatality risk for a potential victim. The countermeasures studied whose effects upon fatalities are major and have been sufficiently well established were safety belts, high-penetration-resistant windshields, and energy-absorbing steering column assemblies. For lap belts alone, a 35% reduction of fatalities is estimated as the overall average in accidents where they are used. Combination of lap belts with shoulder belts should increase the reduction by at least another 10%. For the windshields alone, a fatality reduction of 5% is estimated. One study suggests a reduction of fatal injuries due to the energy absorbing steering columns by 17%, the actual fatality savings may be lower since other injuries may become more frequent; an estimate of 10% savings appears more realistic.

Search terms: Occupant protection; Crash phase; Fatality prevention; Fatality causes; Accident studies; Accident analysis; Injury prevention; Injury severity; Injury research; Fatality rates; Injury causes; Vehicle age; Energy absorbing steering columns; Fatalities by seat occupation; Windshield penetration; Ejection caused injuries; Accident survivability; Secondary collisions; Shoulder harnesses; Windshields; Seat belt effectiveness; Automobile safety characteristics; Accident types; Injuries by seat occupation

HS-012 117 Fld. 5/14

HOW TO TURN A 3-POINT INERTIA BELT INTO A PASSIVE SEAT-BELT SYSTEM

by M. J. W. Coenen

Coenen N.V. (Netherlands), C50130

1972 4p
Report no. SAE-720523

Presented at 2nd International Conference on Passive Restraints, Detroit, 22-25 May 1972.

The main objectives of the program were to prove that it would be possible to use existing seatbelt systems to cope with future requirements for occupant restraints and that therefore existing anchor points (or at least the existing systems) could be used. The aim was to use only existing techniques in order to reach a high reliability standard and to design a system that also could meet current homologation requirements. A prototype was developed with a combination of a 3-point seat belt with running loop with an inertia reel at the central lap belt, in combination with loops around the webbing of the seat belt running along cable-operated tracks. The prototype met all the objectives.

Search terms: Three point restraint systems; Restraint system design; Inertia reels; Seat belt assemblies; Seat belt assembly anchorages; Passive restraint systems

AVAILABILITY: SAE

5/15 Propulsion Systems

HS-012 072 Fld. 5/15

DEVELOPMENT OF HIGH-ENERGY BATTERIES FOR ELECTRIC VEHICLES. PROGRESS REPORT

by E. J. Cairns; R. K. Steunenberg; J. P. Ackerman; B. A. Feay; D. M. Gruen; M. L. Kyle; R. W. Latimer; J. N. Mundy; R. Rubischko; H. Shimotake; D. E. Walker; A. J. Zielen; A. D. Tevebaugh

Argonne National Lab., A51800

1971 97p 28refs
Report no. ANL-7888

Report for Jul 1970-Jun 1971. Sponsored by the Atomic Energy Commission and the Environmental Protection Agency.

5/15 Propulsion Systems (Cont'd.)

HS-012 072 (Cont'd.)

The objective of this program is to develop the technology required to construct secondary batteries having the performance capabilities necessary for pollution-free electric automobiles. Lithium sulfur cells using a molten lithium halide-containing electrolyte and operating at 360 to 390° C have achieved capacity densities and power rates that are consistent with the specific energy and specific power goals, but the cycle life (currently hundreds of cycles) and the sulfur electrode performance require further improvement. The cell development program is supported by laboratory studies in various areas including: phase equilibrium studies of electrolyte-containing mixtures; studies of sulfur-bearing species in molten alkali halides; solid electrolyte studies; cathode materials studies; mass-transport studies; materials testing and fabrication; and electric automobile performance calculations. The results of these investigations to date are presented.

Search terms: Lithium sulfur batteries; Battery design; Battery life; Battery cases; Electrolytes; Electric power generation; Miscibility; Phase diagrams; Cathode materials; Electrodes; Titration; Sulfides; Eutectics; Materials tests; Corrosion resistance; Corrosion tests; Insulation; Seals; Laboratory tests; Performance tests; Automobile performance; Driving conditions; Lithium; Halides; Electric automobiles; Sulfur; Battery tests

AVAILABILITY: NTIS $3.00

HS-012 090 Fld. 5/15; 5/6; 4/7

ADVANCED AUTOMOTIVE POWER SYSTEM STRUCTURED VALUE ANALYSIS MODEL

by J. Dukowicz; W. Fraize; E. Keitz; S. Poh; J. Stone

Mitre Corp., M52800

1971 286p 64refs
Contract F19628-71-C-0002
Report no. MTR-6085; PB-209 286

This document presents the Structured Value Analysis Model developed for the Environmental Protection Agency. The model will provide a tool for evaluating advanced low-emission power systems, and a basis for decisions relating to further development of candidate power systems. The Advanced Automotive Power System program is directed toward the goal of producing an unconventionally powered, virtually pollution free automobile within five years. In order to achieve this goal, a large number of candidate systems must be evaluated. The list of the evaluation parameters is provided; the cost and economic factors critical to the evaluation of candidates are discussed; the analytical formulation of the model is presented; the results of the sensitivity analysis conducted on the model are presented; and the computer program is described.

Search terms: Propulsion systems; Vehicle weight; Carbon monoxide; Hydrocarbons; Exhaust emission standards; Nitrogen oxides; Sulfur oxides; Particulate air pollutants; Smoke; Noise; Engine operating conditions; Odors; Energy storage systems; Environmental factors; Vehicle air pollution; Automobile design; Vehicle operating costs; Automobile costs; Value analysis; Mathematical models; Simulation models; Computerized simulation; Fuel costs; Automotive industry; Air pollution emission factors; Electric automobiles

AVAILABILITY: NTIS

5/17 Safety Defect Control

HS-810 243 Fld. 5/17; 4/3

RELIABILITY AND COST AS FACTORS IN STANDARDS ENFORCEMENT

by F. Armstrong; C. A. Martin

National Hwy. Traf. Safety Administration, N19900

Published in *American Society for Quality Control Annual Technical Conference (26th) Transactions,* Milwaukee, 1972 p225-36

12refs

The reliability-cost approach to providing management with a quantitative evaluative tool is presented. This tool aids in those decisions involving the reconciliation of what are often conflicting areas of program interest: cost of testing and desired quality levels. In addition, it also allows another important program parameter: the impact of associated, generated administrative workload to be quantified and, within the constraints of the first two parameters, controlled.

Search terms: Safety standards compliance; Automobile safety standards; Reliability; Quality control; Compliance tests; Safety standards costs; Sampling; Benefit cost analysis; Law enforcement; Program evaluation; Safety device costs

AVAILABILITY: NHTSA

5/18 Steering Control System

HS-012 102 Fld. 5/18

THE CONFLICT BETWEEN TRACTION AND STABILITY IN PASSENGER CARS

by S. H. Grylls

Published in *Institution of Mechanical Engineers Proceedings* v186 n17 p169-77 (1972)

2refs

Prepared for presentation at an ordinary meeting of the Institution of Mechanical Engineers Automobile Division, Solihull, England, 11 Apr 1972.

he understeer of front-engined rear-heel driven cars diminishes with speed. he paper deals with reasons for this henomenon, the usual palliatives for hich reduce available traction. The onfigurations available to a designer for oth traction and stability are: front eaviness and front-wheel drive for mall, low powered cars; front heaviness nd four-wheel drive for large cars; a eight distribution of 51/49 and at-ention to shape where the cost of our-wheel drive or the complexity eems out of the question.

Search terms: Vehicle stability; Understeer; Oversteer; Cornering; High speed; Weight distribution; Aerodynamics; Wind forces; Yaw; Lateral force; Traction; Steering systems; Rear wheel drives; Four wheel drives; Front wheel drives; Rear suspension systems; Skid pan tests; Vehicle size

5/20 Trucks and Trailers

HS-012 123 Fld. 5/20

DESIGNING A HYDRO-MECHANICAL TRANSMISSION FOR HEAVY DUTY TRUCKS

by W. A. Ross

Sundstrand Corp., SS1910

1972 7p
Report no. SAE-720725

Presented at National Combined Farm, Construction, and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

This paper deals with the design of a fully automatic heavy-duty truck transmission employing hydromechanical principles. Truck requirements are analyzed, features of hydromechanical transmissions are explained, and the specific design chosen is compared with these requirements. The hydromechanical engine fuel consumption. The size, weight, and price are generally competitive with other automatic and manual transmissions.

Search terms: Automatic transmission design; Truck design; Hydraulic equipment; Fuel consumption; Performance characteristics; Hydromechanical transmissions; Heavy duty vehicles; Engine speeds

AVAILABILITY: SAE

HS-012 126 Fld. 5/20

POLYTRAC–A UNIQUE APPROACH TO ENGINEERING PROBLEMS

by D. A. Nordstrom

Gates Rubber Co., G00400

1972 6p 4refs
Report no. SAE-720745

Presented at National Combined Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

The development of a new internal drive lug system for snowmobile tracks is discussed. The principal feature of this system is the molding or casting of pairs of drive lugs on the inside surface of the track. A tanged drive wheel rolls between the drive lugs engaging these lugs with projecting tangs. With the exception of acceleration and braking, the rolling wheel alone performs much of the track propulsion. The analysis used in selecting polyurethane as the elastomer, the development of a suitable manufacturing method, and some of the facets of tread design are described.

Search terms: Snowmobile tracks; Drive systems; Elastomers; Snowmobile design; Casting; Rubber; Polyurethanes

HS-012 130 Fld. 5/20

DRIVE LINE TORQUE COUPLING FOR TRACTOR DRAFT CONTROL

by C. E. McKeon

Ford Motor Co., F18600

1972 10p 2refs
Report no. SAE-720710

Presented at National Combined Farm, Construction, and Industrial Machinery and Powerplant Meetings, Milwaukee, 11-14 Sep 1972.

This paper discusses the development of the drive line torque sensing coupling that is one of the basic components in the Load Monitor draft control system for agricultural tractors. Outlined are the design requirements for the torque sensor, the initial concepts considered, the evaluation and testing procedures and results, and the evolution of the early prototypes to the current production level. The Load Monitor torque coupler has demonstrated highly satisfactory performance and durability in this tractor draft control system application. Indications are that other applications of this type of torque coupling in tractors, self-propelled implements, and other equipment are desirable and entirely feasible.

Search terms: Couplers; Torque; Drivelines; Farm tractors; Transducers; Sensors; Hydraulic equipment; Performance characteristics; Performance tests; Load bearing capacity; Rear axles; Electronic monitoring systems

AVAILABILITY: SAE

5/23 Windshield-Related Systems

HS-012 087 Fld. 5/23

WAX METHOD OF DETERMINING WINDSHIELD DEFROSTER PERFORMANCE

5/23 Windshield-Related Systems (Cont'd.)

HS-012 087 (Cont'd.)

General Motors Corp., G06600

1972 6p
Report no. SAE-720504

Presented at National Automobile Engineering Meeting, Detroit, 22-26 May 1972.

This paper describes a procedure for determining defroster performance using wax. The approach is a useful tool for establishing breakthrough points, and developing balanced defroster air distribution patterns prior to cold room testing. Since it can be conducted at room temperature, the wax method is considerably more convenient and can be executed with greater frequency than in a cold room. Although the wax procedure is a good barometer of the relative effectiveness of different defroster systems, and does provide valuable preliminary studies, it does not duplicate cold room conditions. The test method described, therefore, is not a substitute for, nor can it be used in place of, actual cold room testing. The paper provides information on the test facility, test equipment, test preparation, wax mixture and application, and conducting the test.

Search terms: Defrosters; Waxes; Performance tests; Test equipment; Test facilities; Windshields

AVAILABILITY: SAE

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